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L. G. HANSCOM FIELD, BEDFORD, MASSACHUSETTS

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CHAPTER 5. DETERMINATION OF THE FIGURE, DIMENSIONS, AND GRAVITATIONAL FIELD OF THE EARTH

In the course of the reporting period, papers have been published in the Soviet Union on the further development of Molodenskiĭ's theory. Using the derivation of Marych, Pellinen (1967) pointed out the identity of the results of computation of quasi-geoid heights and deflections of the vertical at the earth's surface by Molodenskiĭ's 1960 formulas with allowance for Arnold's corrections.

Eremeev (1967) proposed a method of numerical solution of Molodenskiĭ's integral equation for the density of a simple layer. The advantage of this method lies in the uniformity of operations in all the approximations and the absence of apparent disturbances of the process of convergence of the successive approximations for slopes of the physical surface greater than 45°.

In deriving formulas for the deflection of the vertical, one must bear in mind the correction of Brovar (1965a) and the earlier note by Marych (1964a). Since the effect of slopes of the earth's surface on the deflection of the vertical is an order of magnitude greater than their influence on quasi-geoid heights, the formulas for the deflections of the vertical must include small terms that can be neglected in the derivation of quasi-geoid heights.

Brovar (1965a) also refines the solution of Molodenskiĭ's 1960 integral equation. However, Eremeev points out in the abovementioned article that the refinement relates to terms that are negligible owing to

the approximate nature of the starting equations. The terms to be refined have an order of flattening as compared with the principal terms.

Pursuing research reported by Molodenskii in 1945 (Trudy TSNIIGAiK, No. 42), in the study of the physical surface of the earth and its external gravitational field Eremeev and ÎUrkina (1967a) establish the boundary condition for the disturbing potential (a condition used in the theory of the figure of the earth) on a surface to be determined rather than referring to a sphere or ellipsoid in the determination of the regularized geoid and to a surface obtained by plotting from the reference surface of the normal heights only.

In the allowance for the effect of distant zones in Molodenskiĭ's formulas of the first approximation, Pellinen (1965b) proposed a method of computation for the sum of the average values of the gravity anomalies and for the G_1-correction with respect to trapezoids of the order of $1^{\circ} \times 1^{\circ}$ and greater, avoiding determination of those corrections at individual points. To the accuracy of a small term, that sum is equal to the sum of the mean partial topographic gravity anomaly and the mean Bouguer reduction with selection of the optimal density of the intermediate layer. It was also shown that in computing deflections of the vertical, one can, with a negligible error, exclude from the gravity anomalies a constant term equal to the anomaly at the point under study.

In a paper by Eremeev and ÎUrkina (1965a), the derivative of the disturbing potential along a tangent to the physical surface is expressed through the values of the gravity anomaly and disturbing potential at points of that surface. In the expressions for the disturbing potential deflection of the vertical, and Stokes' constant obtained on the basis

of Molodenskiĭ's integral equation for the disturbing potential, they isolate a part that constitutes the Stokesian approximation to those quantities. For computation with a relative accuracy of the order of the earth's flattening, the subintegral functions of the corrective terms are represented through the elevations and geodetic latitudes and longitudes of the point under study and a running element of the earth's surface, and through slopes in the running element. The expression for the deflection of the vertical is studied with a model earth in the form of a cone situated on a reference plane. This principle of computations on the basis of Molodenskiĭ's integral equation for the disturbing potential was studied by I͡Urkina and Starostina with the same model. In articles by I͡Urkina and Aleksashina (1965) and by I͡Urkina, Karachanskai͡a, and Starostina (1966), the individual corrective terms of the expression for Stokes' constant and the mean value of the square of the slopes were evaluated for a mountainous area.

Stoĭnov (1966) expressed the direct deflection of the vertical through values of the gravity anomalies and disturbing potential at running points of the earth's surface. The derivation of Molodenskiĭ's integral equation for the disturbing potential was used as the basis.

Ostach (1967a) synthesized a singular integral equation for the Green's function of Molodenskiĭ's problem. The solution of that equation by expansion over the parameter k was examined. The determination of Stokes' constants with Green's functions was also examined.

In a number of papers, V. V. Brovar described his quests for new solutions to Molodenskiĭ's problem, the determination of the external gravitational field of the earth from values of gravity on its surface. The essence of his efforts was described in brief form by Brovar in a report to

the IUGG Assembly in Berkeley published in Bull. Géod., 1964, No. 72, 167-173. As a basis for the formulas for the disturbing potential and its derivatives above the earth, Brovar (1963b) took a solution to Molodenskiĭ's equation for the density of a simple layer.

Brovar (1964a) examined surface integrals which, outside a boundary surface, are similar in properties to the potential of a simple layer, the potential of a dual layer, and the potential of three-dimensional masses. Brovar proposes using those integrals to represent an arbitrary function that is harmonic outside the surface and to formulate on that basis new integral equations for the auxiliary densities.

In another paper, Brovar (1964b) also continued studies begun earlier. Critical remarks on that article were expressed by Mihal' (1966). In a 1966 article, Brovar presented practical conceptions about the solution of an equation for the interconnected densities of a simple layer and a dual layer.

Eremeev improved the formulas for normal heights and gave a review of Western literature on the computation of normal and other heights; he mentioned inaccuracies in determinations of the normal height and gave a critique of papers by Rune, Vignal, Simonsen, Bokun, Chojnicki, and others.

Ostach (1967b) described a method for computing the vertical gradient of gravity at the earth's surface. This gradient had been expressed through Δg-anomaly values by I͡Urkina (1965). Ignatova (1965) estimated the errors of Numerov's formula for the vertical gradient of gravity with model earths having different slopes of the surface.

Strakhov described a method, designed for use with high-speed computers, for computation of the vertical gradient of gravity from its anomalies as given on a plane. He also developed a theory of the synthesis of computational systems for the determination of the higher vertical derivatives and the analytic continuation.

Monin (1966d) proposed a modification of Molodenskiĭ's 1960 method of solution of the integral equation for the function χ, but he did not look into the obvious errors of the approximations nor point out approaches to improvement of the results. Earlier, Monin (1963a) had proposed that in the solution of the equation for the density of a simple layer of Molodenskiĭ's 1960 method, the earth's surface be subjected to transformations with the parameter k or that the normal values of gravity be varied in the computation of its anomalies. Eremeev and I͡Urkina pointed out that the process of successive approximations might consequently be slowed down. Brovar (1965b) characterized Monin's proposal as gravely impairing the accuracy of the computations under real conditions. By computation with a model earth, Monin (1965b) saw for himself the inadvisability of his proposal.

After differentiating a somewhat modified Molodenskiĭ integro-differential equation for the disturbing potential, Monin (1966) expressed the deflections of the vertical through values of the gravity anomalies, quasi-geoid heights, and deflections of the vertical at running points of the earth's surface. In another article, Monin (1965c) applied Molodenskiĭ's method to Molodenskiĭ's integral equation for the disturbing potential. The zeroth approximation is the Stokesian. In the subsequent approximation, the curvature of the surface must be computed at each running point.

An article by Monin (1965a) is devoted to solution of one of the equations formulated by Brovar (1964). After expressing a doubt about his own results, Monin (1965b) obtained the same formulas by a different means. Individual approximations were written down by Monin (1965a) for quasi-geoid heights, deflections of the vertical, and anomalies of the vertical gradient of gravity, which in his opinion were suitable for computations. A critique of Monin's papers was given by Brovar (1965b).

Through two approaches, Monin (1966) obtained an expression for the disturbing potential in terms of the values of the gravity anomaly and its derivative along the normal to the earth's surface at running points. In both cases, the author employed an incorrect procedure, viz., the expansion of a quantity inversely related to the distance r between the fixed point and the running point on the boundary surface in Legendre polynomials. For computation of the derivative $d\Delta g/dn$, Monin formulated a Fredholm integral equation of the first kind, for which he proposed solution by expansion over the parameter k by Molodenskiĭ's method.

Monin also developed methods of determination of a regularized geoid with a relative error of the order of the square of the earth's flattening and derivations without the use of a normal field.

Filippov (1965) derived formulas defining the physical surface of the earth with allowance for second-order quantities, but without using a normal field, which Mihal' (1949) had also forgone.

The sum T' of the zeroth and first approximations to the disturbing potential after Molodenskiĭ (1960) was reduced by Marych (1965) to the form

$$T' = T_r + \frac{dT}{dH} H \quad ,$$

where
$$T_r = \frac{R}{4\pi}\int\left(\delta g_0 - H\frac{d\Delta g}{dH}\right)[S(\psi) - 1]\, d\sigma$$
$$\delta g_0 = \Delta g - \frac{2(W_0 - U_0)}{R} \quad ,$$
H is the height of the earth's surface, and $S(\psi)$ is Stokes' function.

In the derivation, it was assumed that Numerov's formula defines the vertical gradient of the gravity anomaly. Furthermore, Marych obtained a formula for the deflection of the vertical in the ℓ-direction:
$$\vartheta = \frac{1}{\gamma}\left(\frac{\partial T_r}{\partial \ell} - H\frac{\partial g}{\partial \ell}\right).$$

In the articles by Aronov et al., there are descriptions of a procedure for computation with a computer and of model-earth calculations of elements of the external gravitational field in terms of Δg-values on a reference plane that account for the Δg-values at gravity stations. There is also a review of the techniques for reducing the gravity anomalies from the earth's surface to the plane. Aronov proposes that the gravity anomalies on the lower surface be computed with a Poisson integral to be regarded as an integral equation of the first kind. The step of the integration must be approximately equal to the step of the survey. Since in the general case it is impossible to account for the field of the gravity anomalies on the physical surface of the earth through a field on the lower plane, the solution to the problem may be unstable.

The errors of computation with the models employed are one-third as great or better than when Stokes' theory is used. In a paper by Aronov and Gordin (1966b), there is a numerical evaluation of the accuracy of the interpolation of derivatives of the gravitational potential for a mountainous area on the basis of Aronov's procedure. By those authors' estimate, the accuracy is sufficiently high.

Pellinen (1967) gave a review of the methods of computation of deflections of the vertical and quasi-geoid heights in mountains. Pellinen recommends that the Aronov-Bjerhammar method be used to isolate the regional part of the gravity anomalies and that the rest of the anomalies be interpreted with a simple layer on the earth's surface.

In view of the complications involved in practical application of Molodenskiĭ's theory, Mihal' (1965) replaces the geoid by a surface $\bar{S}$ whose distances $\bar{H}$ from the physical surface of the earth at each of its points in the direction n of the vertical at the point are defined by the formula

$$\frac{W_o - W}{g} = \bar{H} + \frac{1}{2}\frac{1}{g}\frac{dg}{dn}\bar{H}^2 .$$

Here W is the earth's gravity potential, W_o its sea-level value, and g gravity. The formula recommended by Mihal' is obtained by expansion of potential W in the series

$$W_o = W + \frac{dW}{dn}\bar{H} + \frac{d^2W}{dn^2}\frac{\bar{H}^2}{2} + \ldots .$$

In this series, one must take the outer limiting values of all the derivatives. The author does not evaluate or allow for the influence of terms with third and higher derivatives of W.

He postulates that the surface obtained can be regarded as the external niveau surface of a planet which creates a gravitational field coinciding with the true external gravitational field of the earth.

An article by Molodenskiĭ on the accuracy of computation of the anomalous part of the earth's external gravitational field that has been prepared several years earlier was published in 1967.

Pellinen (1965a) submitted a procedure for deriving the coefficients of an expansion of the earth's gravitational potential over spherical functions from a simultaneous reduction of gravimetric and satellite data. Pellinen (1966) describes a procedure for computation of the coefficients in an expansion of the disturbing potential over spherical functions on the basis of gravity measurements at the earth's surface. The second method of Neumann is recommended. It is proposed that the gravity anomalies be smoothed by averaging over the area within a circumference with a radius that is constant for each point of the surface. Pellinen presented conceptions about the optimal relation among the number of the harmonic, the spacing of the gravity survey points, and the aforementioned radius. He examined problems of the interpolation and extrapolation of gravity and allowance for the elevation dependence of the Δg-anomalies. He also gave formulas for determination of the weights of the averaged gravity anomalies from correlational analysis of gravity and the variances and covariances of the coefficients.

Ostach and Pellinen (1966) gave formulas with which to correct the coefficients of the spherical harmonics of the disturbing potential of a regularized earth for its flattening. The corrections have the order of the product of the square of the earth ellipsoid's eccentricity times the order of the spherical harmonic. They must be applied in the determination of those coefficients from the gravity anomalies at the earth's surface with Stokes' series.

After differentiating an equation of astrogeodetic and gravimetric measurements for quasi-geoid height given earlier in a paper at the Prague symposium on the theory of the figure of the earth, Izotov (1965) obtained analogous equations for the deflection components. The free terms include astronomical and geodetic coordinates.

According to calculations by Grushinskii and Sagitov, neglect of currents in marine determinations of gravity can introduce an error of 15 mgal under unfavorable conditions. After the corrections to the measured gravity values to allow for currents were expanded with a computer in series over the spherical functions up to order 16, it was concluded that the influence of neglect of currents can introduce an error of 0.1 in the denominator of the earth's flattening. Tables of the coefficients of the expansion were obtained for summer and winter.

Marych (1964) showed that the Stokes, Pizzetti, and Brovar formulas define the regularized geoid with an arbitrary degree of accuracy on the condition of corresponding smallness of the gravity anomalies, which can be satisfied through the choice of normal gravitational field.

Marych (1963) described the principle of determination of the regularized geoid with allowance for small quantities of n-th order without the use of a normal field.

Gromov obtained an integral formula for the disturbing potential on a regularized geoid through the anomalies of the gravity gradient on that geoid.

Molodenskiĭ merits first mention in the development of the geometric methods of the present-day theory of the earth's figure. Those methods were the subject of several papers of his published in 1949 through 1954. Using the procedure pointed out by Molodenskiĭ, recently Eremeev and I͡Urkina (1966) proposed formulas for the computation of astronomical coordinates from angle measurements and examined some other problems that arise in the evolution of three-dimensional geodetic

nets. The transfer of astronomical coordinates from one point to another was also studed by Rudskiĭ (1965, 1966).

Bordering on those subjects are several papers concerning the development of a theory of joint adjustment of geodetic latitudes and longitudes and quasi-geoid heights.

Pellinen (1963) showed that the azimuthal condition is affected by only the lateral errors of a triangulation; this influence does not depend on the latitude and direction of the chain. The corresponding distortions of the azimuthal condition do not lead to additional lateral errors of the triangulation chain along a great-circle arc and indirectly influence the longitudinal shift of the chain along the parallel. The formulas given earlier by Pellinen for the transverse and longitudinal shifts (Geod. i kartografiia, 1961, No. 10, 3-9) have been improved.

Eremeev and IUrkina (1967c) improved Molodenskiĭ's integral formulas for the radial and longitudinal shifts in the initial reduction of a triangulation by a development method, as compared with the version of those formulas in a 1960 monograph by Molodenskiĭ et al. (Trudy TSNIIGAiK, No. 131)*), since the improved formulas allow for the angular difference between the normals to the quasi-geoid and reference ellipsoid on the one hand and the deflection of the vertical at the physical surface of the earth on the other.

The same authors (1967b) described a technique of simultaneous adjustment of geodetic latitudes and longitudes and quasi-geoid heights.

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*) Engl. transl.: Methods for Study of the External Gravitational Field and Figure of the Earth. Jerusalem, Israel Program for Scientific Translations, 1962--Tr. note.

They propose that the preliminary adjustment of individual ties of the triangulation be alternated with the computation of quasi-geoid heights at astronomical triangulation points by Molodenskiĭ's formula of astro-gravimetric leveling. They adcpt as directly measured quantities the lengths of arcs projected on the reference ellipsoid, the azimuths of those arcs, and gravimetric corrections (δ) for the nonlinearity of the variation of the deflection of the vertical on those arcs. Molodenskiĭ's integral formulas need not be employed in their procedure.

The technique was illustrated with a model net described by I͡Urkina et al. (1967). Into measurements that could be said to have been made on a niveau sphere-geoid, they introduced errors on the expectation that the RMS errors of the measurements of the arcs, azimuths, and δ-values, respectively, were equal to ± 3 m, ± 0.2, and ± 1.5 m (the arc lengths of the model net being close to 3000 km). The results of the computations demonstrated the advantage of the proposed method over individual adjustment of plane coordinates and quasi-geoid heights.

In the solution to this problem given by Muralev, it is proposed that Molodenskiĭ's integral formulas be used. Muralev also studied questions of the practical application of Molodenskiĭ's formulas.

A paper by Pellinen, Taranov, and Shabanov described a computer procedure for computation of gravimetric quasi-geoid heights and deflections of the vertical with the Stokes and Vening Meinesz integral formulas.

Krzhizhanovska͡ia used the maps she had prepared earlier for the gravimetric deflections of the vertical in the trapezoid between latitudes

$53^{\circ}15'$-$54^{\circ}15'$ and longitudes 59-60° to compute the differences of the gravimetric quasi-geoid heights with respect to one of the points of the area. The accuracy of the computation was estimated at 20 cm.

By the estimate of Surnin (1964), the coordinates of the earth's center of mass can at present be determined with an error of about ± 100 m and points of isolated geodetic systems can be tied by physical methods with an error of about ± 140 m.

A paper by Dul'$\widehat{\text{ts}}$ev (1965) concerns the determination of the scale reduction constant introduced by Mihal'.

Ražinskas estimated the accuracy of the interpolation of astro-geodetic deflections of the vertical by gravimetric deflections for the territory of Lithuania and plotted maps of the deflections of the vertical and the quasi-geoid for its western part.

Andreev (1966) represented the components of attraction of a niveau ellipsoid along a radius vector from the center and along a direction perpendicular to the radius vector in the plane of the meridian, in the form of series in powers of eccentricity e and of the ratio of centrifugal force to gravity at the equator. Terms of order e^4 were retained. The expressions are real on the surface of the ellipsoid and outside it. Analogous series were used to represent the attraction components along a normal to the ellipsoid and along a direction perpendicular to the normal in the meridional plane. The series are real on the surface of the ellipsoid and at a height h above it on the condition that the ratio of h to the semimajor axis have the order of e^2.

For the determination of gravity outside a certain surface from its values on the surface, Alek'si$\widehat{\text{dz}}$e (1965) proposes two approximation

methods. The reduction of the external problem to an internal one made it possible to use a finite-difference method adapted for general-purpose digital computers. The rate of convergence of the iterations and the organization of a full automation were examined. The author reduces the second method to an expansion in Fourier series or the solution of a system of algebraic equations. The derivation of the higher derivatives of gravity on the basis of the two methods is also examined.

Historical studies and reviews were published by Zhongolovich, Sologub, and Stuopis. Zhongolovich compared the possibilities of determination of the harmonics of the earth's gravitational field from a ground-based gravity survey and from the motion of artificial earth satellites. Information on determinations of the zonal harmonics (with corresponding values of the flattening of the earth) and tesseral harmonics (with corresponding values of the difference of the semiaxes of the equatorial ellipse and the longitude of its semimajor axis) has been compiled in tables.

An article by Antoni͡uk (1964) concerns two papers by Sludskiĭ (1841-1897), "On the deflection of plumb lines" and "General theory of the figure of the earth," since whose publication 100 and 75 years had passed, respectively, in 1963.

Makarov (1965) noted the importance of a uniform understanding of the various anomalies of gravity and, in particular, recommended a distinction between the free-air reduction and the Faye reduction.

Gramenitskai͡a and Filimonov described an attachment to stereophotogrammetric instruments for determination of the corrections to

gravity measurements for the relief of the neighboring zones from aerial photographs.

In articles by Zavgorodniĭ and by Kazinskiĭ, individual problems of numerical integration are examined.

Menaker designed charts for the computation of the terrain correction with an accuracy of 0.2-.3 mgal from the elevation contours around a gravimetric point. In allowance for the topographic masses of the immediate surroundings, Zemli͡anov proposes the use of a formula of the attraction of thin horizontal slabs in the form of polyhedrons, as a basis for a computer program. A procedure for computation of topographic corrections to gravity with a computer was also examined by Aronov et al.

Budriukov compiled tables of normal gravity values in accordance with Helmert's formula (1901-1909) to an accuracy of 0.01 mgal with Gaussian plane rectangular coordinates in the argument, for the latitude belt 32-77°. He appended tables of corrections for conversion from Helmert's formula to those of Cassinis, Krasovskiĭ, and Zhongolovich.

Zagrebin corrected an inaccuracy that appeared in one of his earlier papers (Trudy In-ta teoreticheskoĭ astr., 1952, No. 1, 87-222).

Mihal' expressed a doubt about the possibility of deriving deflections of the vertical on the basis of a local gravity survey with an accuracy better than 0.''5. A reply to his article was published by I͡Urkina and Eremeev (1964).

Novoselit͡skiĭ examined a particular case of the problem of analytic continuation of gravity anomalies (with two-dimensional distribution of the attracting masses).

The articles by Brovar et al. and by Voskoboĭnikov et al. embody critiques of papers by Malovichko and his co-workers.

Research was carried out on the gravitational field of the Indian Ocean and Antarctica (Avsi͡uk, Frolov, Gaĭganov). The shape of geoid surfaces in Antarctica was investigated by Frolov.

An Atlas of Antarctica representing the work of a large number of specialists was published. The gravimetric maps to be found in the Atlas give an idea of the state of gravimetric research in Antarctica.

The list of references includes papers relating directly to the geological interpretation of gravity anomalies, but also offering an interest or useful information from the point of view of the study of the earth's gravitational field and figure.

References*)

Aleksashina, G. A. (1966): Influence of the immediate surroundings on the topographical correction of gravity, Trudy TSNIIGAiK No. 171, 84-91.

Alek'sidze, M. (1965a): Reduktsiia sily tiazhesti [Reduction of gravity] T'bilisi, Mets'niereba, 256 pp.

* ____________ (1965b): Restatement of the gravity-reduction problem as the solution of inner boundary value problems, Izvestiia AN SSSR, Fizika Zemli No. 4, 52-59.

*Andreev, B. A. (1963): Concerning M. E. Artem'ev's article "On an approximate allowance for the isostatic correction and on the isostatic state of Antarctica," Izvestiia AN SSSR, Ser. geofiz. No. 2, 347-348.

*Andreev, V. D. (1966): Solution of Stokes' problem for a niveau surface given in the shape of a spheroid, Prikladnaia mat. i mekh. No. 2, 410-413.

Antoniuk, E. I. (1964): Example of the joint employment of astronomical and geodetic data, Materialy MGG, Informatsionnyi biulleten' No. 6, 133-136.

Aronov, V. I. (1963): Reduction of gravity anomalies in a mountainous area, Geofiz. razvedka No. 14, 80-91.

* ____________ (1964a): Computation of deflections of the vertical from Δg-observations in a mountainous area, Izvestiia vuzov, Geod. i aerofotos"emka No. 6, 65-71.

____________ (1964b): Trial reduction of gravity anomalies in a mountainous area, Geofiz. issledovaniia [Moskovskogo un-ta] No. 1, 121-129.

*) Unless otherwise stated, the language in which the items originally appeared was Russian; an asterisk prefixed to an item indicates that it appeared in a journal translated in the U.S. --Tr. note.

Aronov, V. I., I. I. Borodatyĭ, and L. E. Fil'shtminskiĭ (1964): Trial computer-aided calculation of terrain corrections for a mountainous area, Geofiz. razvedka No. 15, 104-111.

*Aronov, V. I. and V. M. Gordin (1966a): Computation of V_{zz}-values for a mountainous region, Izvestiia vuzov, Geod. i aerofotos''emka No. 1, 79-83.

* ______________ (1966b): Interpolation of derivatives of the gravitational potential in a mountainous area, ibid., No. 3, 88-93.

Aronov, V. I. and I. V. Konoval'tsev (1963): Computer-aided solution of some problems of gravimetric prospecting, Izvestiia vuzov, Geol. i razvedka No. 10, 99-111.

*Artem'ev, M. E. (1963): On an approximate allowance for the isostatic correction and on the isostatic state of Antarctica, Izvestiia AN SSSR, Ser. geofiz. No. 2, 345-346.

Avdulov, M. V. (1963): Estimation of the accuracy of gravity maps, Prikladnaia geofiz. No. 36, 167-180.

* ______________ (1966): Some problems of quantitative interpretation of gravity anomalies above bodies of regular shape, Izvestiia AN SSSR, Fizika Zemli No. 10, 77-86.

Balabushevich, I. A. (1963): Vysshie proizvodnye potentsiala sily tiazhesti i vozmozhnosti ikh ispol'zovaniia v geologicheskoĭ gravimetrii [The higher derivatives of the gravity potential and possibilities for their employment in geological gravimetry]. Kiev, AN UkrSSR, 267 pp., ill.

Berezkin, V. M. (1964): Metodika ucheta vliianiia rel'efa mestnosti na pokazaniia gravimetrov pri nabliudeniiakh po priamolineinym profiliam [Procedure of allowance for the influence of the local relief on gravimeter readings in observations along straight profiles]. Moscow, Gos. geol. komitet SSSR, VNII geofiz. metodov razvedki, 21 pp.

______________ (1965): Computation of the density of the intermediate layer from gravity data by solution of a system of equations under a Cauchy technique, Prikladnaia geofiz. No. 41, 126-132.

Berezkin, V. M. and N. IU. Nefedova (1965): Determination of the density of the intermediate layer with the aid of information theory and mathematical statistics, Razvedochnaia geofiz. No. 5, 39-46.

*Brovar, V. V. (1963a): Solution of several outer boundary value problems of the earth's surface, Izvestiia vuzov, Geod. i aerofotos''emka No. 1, 55-72.

*____________ (1963b): Computation of the disturbing potential and its derivatives above the earth, ibid., No. 3, 57-63.

*____________ (1963c): On the solution of Molodenskii's boundary value problem, ibid., No. 4, 129-137.

*____________ (1964a): Outer generalized potentials, ibid., No. 1, 18.

*____________ (1964b): Fundamental harmonic functions with a singularity on a segment and the solution of outer boundary value problems, ibid., No. 3, 51-61.

*____________ (1965a): Formulas for computation of the disturbing potential and deflection components on the earth's surface, ibid., No. 2, 97-104.

____________ (1965b): Review of I. F. Monin's article "On the determination of the figure and external gravitational field of the earth," Geod. kartografiia i aerofotos''emka No. 3, 160-161.

*____________ (1966): Practical solution of the integral equation for an auxiliary density determining the disturbing potential, Izvestiia vuzov, Geod. i aerofotos''emka No. 4, 79-82.

____________, et al. (1963): Concerning the determination of the external gravitational field and figure of the earth, Geod. i kartografiia No. 10, 74-76.

*Brovar, V. V., L. P. Pellinen, and B. P. Shimbirev (1963): Mikhail Sergeevich Molodenskii, Lenin laureate, Izvestiia vuzov, Geod. i aerofotos''emka No. 3, 53-56.

Budriukov, P. B. (1961): Tablitsy normal'nykh znachenii sily tiazhesti [Tables of normal values of gravity]. Moscow, Gostoptekhizdat, 114 pp.

Bulakh, E. G. (1965): Integral'nye sootnosheniia dlia interpretatsii gravitatsionnykh anomalii [Integral relations for the interpretation of gravity anomalies]. Kiev, Naukova dumka, 116 pp.

Bulanzhe, IU. D. (1965): Symposium on the Determination of the Figure of the Earth, Prague, 6-10 October 1964, Vestnik AN SSSR, No. 2, 86.

Buzuk, V. V. (1964a): The relation among the coefficients of the expansion over spherical functions of the basic characteristics of the earth's gravitational field, Trudy Novosibirskogo in-ta inzhenerov geod. aerofotos''emki i kartografii No. 18, 3-7.

____________ (1964b): Principle of separation of absolute (gravimetric) deflections of the vertical into local and general (planetary) deflections, ibid., No. 18, 9-15.

____________ (1965): Vychislenie vysot kvazigeoida i uklonenii otvesa na fizicheskoi poverkhnosti Zemli--Metodicheskoe posobie dlia studentov astronomo-geodezicheskoi spetsial'nosti Novosibirskogo instituta inzhenerov geodezii, aerofotos''emki i kartografii [Computation of quasi-geoid heights and deflections of the vertical on the physical surface of the earth--Handbook of methods for students of astro-geodetic studies at the Novosibirsk Technological Institute of Geodesy, Aerial Surveys, and Cartography]. Novosibirsk, NIIGAiK, 86 pp.

*Buzuk, V. V. and G. A. Kharkevich (1965): Computer-aided calculation of the planetary characteristics of the earth's gravitational field, Izvestiia vuzov, Geod. i aerofotos''emka No. 3, 95-101.

Chaliuk, T. N. (1962): Concerning a preliminary determination of the reduction constants in the theory of N. K. Mihal', Nauchnye zapiski L'vovskogo politekh. in-ta No. 85, 83-85.

Chebotarev, G. A. (1962): Ivan Danilovich Zhongolovich, on the occasion of his seventieth birthday, Biulleten' In-ta teoreticheskoi astr. No. 9, 696-702.

*Chojnicki, T. (1966): A few remarks concerning N. P. Makarov's article "The Faye reduction," Izvestiia vuzov, Geod. i aerofotos''emka No. 1, 139-140.

*Chulkov-Eidman, V. P. (1963): Determination of the trajectory of a body from the second derivatives of the potential, ibid., No. 5, 95-97.

Dergachev, N. I. (1962a): Determination of the optimal radius of the area covered in the terrain correction in a gravity survey, Geol. i geofiz. No. 5, 135-137.

_______________ (1962b): Chart for computation of the terrain correction in the execution of a gravity survey, ibid., No. 8, 107-110.

Dergachev, N. I. and A. K. Malovichko (1963): The effect of cartographic errors on the accuracy of determination of the terrain correction in gravity observations, Prikladnaia geofiz. No. 37, 154-159.

*Devitsyn, V. M. (1964): A numerical method of analytic continuation of two-dimensional potential fields into a lower half-space, Izvestiia AN SSSR, Ser. geofiz. No. 9, 1376-1388; No. 11, 1654-1673.

*Dimitrov, L. V. (1965): The resolving power of a method using the third vertical derivative of the gravitational potential, Izvestiia AN SSSR, Fizika Zemli No. 9, 89-92.

Dul'tsev, A. T. (1965): Determination of the reduction constant h_o, Geod., kartografiia i aerofotos''emka No 2, 11-18 [cf. also TSirkuliar Astr. observatorii L'vovskogo gos. un-ta, 1967, No. 42, 41-44, 45-51--Tr. note].

Eremeev, V. F. (1964): Some remarks on the computation of leveling elevations in foreign countries, Geod. i kartografiia No. 1, 52-60 [cf. also On the problem of determining normal heights, Stud. geoph. et geod., 1965, No. 1, 1-13(in English)--Tr. note].

_______________ (1965): Concerning the determination of normal heights, Trudy TSNIIGAiK No. 157, 69-84.

_______________ (1967): Concerning the numerical solution of Molodenskii's integral equation for the density of a layer, ibid., No. 176.

Eremeev, V. F. and M. I. IUrkina (1965a): Methods for computations on the basis of Molodenskii's integral equation for the disturbing potential, ibid., No. 157, 3-46.

_______________ (1965b): Remarks concerning I. F. Monin's short communication on the computation of deflections of the vertical, ibid., No. 157, 153-158.

_______________ (1966): Some problems of the reduction of three-dimensional nets, ibid., No. 171, 3-35.

_______________ (1967a): Derivation of the boundary condition of the theory of the earth's figure, ibid., No. 176.

_______________ (1967b): The principle of a compatible equation for plane coordinates and quasi-geoid heights in an astrogeodetic net, ibid., No. 176.

_______________ (1967c): Improvement of Molodenskiĭ's integral formulas for the radial and longitudinal shifts, ibid., No. 176.

Filippov, A. E. (1961): The triaxiality of the earth based on the results of latitude observations in the years 1894-1957, Nauchnye zapiski L'vovskogo politekh. in-ta, Ser. geod. No. 8, 18-22.

_______________ (1965): A generalization of the formulas defining the figure of the physical surface of the earth, Geod., kartografiia i aérofotos''emka No. 2, 54-73.

_______________ (1966): Hotine's method of simultaneous determination of plane and height coordinates of triangulation points, ibid., No. 4, 52-65.

Frolov, A. I. (1964a): The gravitational field of Antarctica and isostasy, Soobshcheniia GAISh No. 135, 43-57.

* _______________ (1964b): The gravitational field and some features of crustal structure in Antarctica, Izvestiia AN SSSR, Ser. geofiz. No. 10, 1449-1461.

* _______________ (1965a): Elevation dependence of the gravity anomalies in Antarctica, Izvestiia AN SSSR, Fizika Zemli No. 3, 82-93.

* _______________ (1965b): Relation among the depth of the Mohorovičić discontinuity, gravity anomalies, and relief, ibid., No. 7, 115-122.

Geod. i kartografiia (1963): The work of Lenin laureate M. S. Molodenskii in the field of the determination of the earth's figure, No. 7, 8-14.

Gladkii, K. V. (1963): Computation of a gravitational effect by analytic continuation, Geofiz. razvedka No. 12, 60-62.

*Gladun, V. A., et al. (1964): Results of geophysical investigations of the crust in Antarctica in the area of Enderby Land, Doklady AN SSSR 158, 345-347.

Gol'dshmidt, V. I. (1962): Equal-action charts for the terrain correction in gravimetric prospecting, Qazaq SSR Ğılım akademiyasınıŋ habarları, Ser. geol. 4(49), 111-118.

Golizdra, G. IA. (1963a): The relation of the singular points of the gravitational potential to the shape of the disturbing masses, Geofiz. sbornik In-ta geofiz. AN UkrSSR No. 5(7), 3-9.

*____________ (1963b): The distribution of the singular points of a gravitational field for one class of two-dimensional bodies, Izvestiia AN SSSR, Ser. geofiz. No. 11, 1701-1708.

*____________ (1964a): The synthesis of computational schemes for the analytic continuation of two-dimensional potential fields with Lagrange interpolation, ibid., No. 2, 228-235.

*____________ (1964b): Computational schemes for the analytic continuation of two-dimensional potential fields by interpolation, ibid., No. 6, 903-910.

*____________ (1965): Correlation-type computational schemes for the analytic continuation of a two-dimensional potential field into a lower half-plane, Izvestiia AN SSSR, Fizika Zemli No. 8, 41-54.

*Golizdra, G. IA. and K. F. Tiapkin (1963): A method for smoothing gravity anomalies, Izvestiia AN SSSR, Ser. geofiz. No. 4, 614-617.

Golushko, P. IA. (1964): Isostasy and isostatic compensation, Geofiz. sbornik In-ta geofiz. AN UkrSSR No. 7(9), 118-125.

Gramenitskaia, N. P. and A. V. Filimonov (1964): Attachment for stereophotogrammetric devices equipped with a parallactic screw, Soviet patent, class 42c/44 and class 42c/10/02 (G01c), No. 179016, reg. 28 Dec. 1964, adv. 23 Mar. 1966 [cf. e. g., Sov. Inventions Illus., October 1966, IID, p. 15--Tr. note].

Gromov, S. V. (1962): Determination of the earth's figure through anomalies of the vertical gradient of gravity, Uchenye zapiski Leningradskogo gos. un-ta No. 307, 234-242.

Grushinskiĭ, N. P. (1963): Teoriia figury Zemli--Uchebnik dlia studentov universitetov [Theory of the figure of the earth--Textbook for university students]. Moscow, Fizmatgiz, 446 pp.

Grushinskiĭ, N. P. and U. U. Sagitov (1963): The role of sea currents in the study of the external gravitational field of the earth, Morskie gravimetricheskie issledovaniia [Moskovskogo un-ta] No. 2, 105-114.

Grushinskiĭ, N. P., N. G. Burova, and M. I. Tarbeeva (1964): Synthesis of an isopachous map of the crust from the relief and the Bouguer anomalies, Vestnik Moskovskogo un-ta, Fizika, astr. No. 5, 46-49.

Gudz, I. N. (1966): Concerning the determination of the dimensions and orientation of the figure of the outer surface of the lithosphere, Geod. kartografiia i aerofotos''emka No. 4, 5-8.

Iakhontova, N. S. (1963): Boris Vasil'evich Numerov (on the occasion of the seventieth anniversary of his birth) 1891-1943, Biulleten' In-ta teoreticheskoĭ astronomii No. 3, 213-215.

Ignatova, M. P. (1965): Estimate of the accuracy of Numerov's formula for the vertical gradient of gravity on model earths, Trudy TSNIIGAiK No. 157, 125-134.

Iun'kov, A. A. (1963): The classification of V_{zz}-anomalies, Geofiz. razvedka No. 13, 65-72.

Iurkina, M. I. (1965): Computation of the first and second vertical derivatives of gravity from maps of its anomalies, Trudy TSNIIGAiK No. 157, 116-124.

Ûrkina, M. I. and G. A. Aleksashina (1965a): Model-earth estimate of the individual terms of the correction to Stokes' approximation of the coefficients in the expansion of the disturbing potential, ibid., No. 157, 58-65.

__________ (1965b): Estimate of the mean value of the square of the slopes on individual segments of a mountainous locality, ibid., No. 157, 66-68.

Ûrkina, M. I., et al. (1967): Equation of the model of an astrogeodetic net, ibid., No. 176.

Ûrkina, M. I. and V. F. Eremeev (1964): Estimating the accuracy of deflections of the vertical and of astronomical and astrogravimetric leveling, Geod. i kartografiia No. 8, 75-78.

Ûrkina, M. I., E. E. Karachanskaia, and A. B. Starostina (1966): Estimation of one term of a Stokesian approximate correction to Stokes' constants on the basis of data from the Caucasus and Central Asia, Trudy TSNIIGAiK No. 171, 69-74.

Ûrkina, M. I. and L. E. Kropotova (1967): Allowance for the influence of the central zone on Molodenskiĭ's G_1-corrections, ibid., No. 176.

Ûrkina, M. I. and Ė. I. Krotkova (1965): Corrections for gravity in leveling in an alpine region, Geod. i kartografiia No. 10, 3-7.

Ûrkina, M. I. and A. B. Starostina (1965): Analog verification of the principle of numerical integration for computation on the basis of Molodenskiĭ's integral equation with respect to the disturbing potential, Trudy TSNIIGAiK No. 157, 47-57.

*Ivanov, V. K. and A. A. Chudinova (1966): A technique for finding the harmonic moments of disturbing masses, Izvestiia AN SSSR, Fizika Zemli No. 3, 55-62.

*Izotov, A. A. (1965): The theory of the determination of the earth's figure and dimensions by satellite tracking, Izvestiia vuzov, Geod. i aérofotos''emka No. 3, 3-11.

Jikiia, V. (1963): Concerning the determination of the exact expression of a gravimetric gradient and its components for a rotating earth ellipsoid, Trudy Gruzinskogo in-ta subtropicheskogo khoz-va No. 7/9, 373-376.

*Karataev, G. I., A. V. Chernyĭ, and I͡U. M. Gusev (1966): Formulation of linear operators in a correlation scheme for geological interpretation of gravitational and magnetic anomalies, Izvestiia AN SSSR, Fizika Zemli No. 12, 28-36.

*Karataev, G. I., I͡U. M. Gusev, and A. V. Chernyĭ (1966): Correlation scheme for plotting geological elements from gravitational and magnetic anomalies, ibid., No. 11, 45-54.

K'art'velišvili, K. (1963): The accuracy of the computation of gravity anomalies for a mountainous region, Sak'art'velos SSR Mets'nierebat'a akademia, Geop'izikis institutis šromebi 21, 221-236.

* ______________ (1964): The conversion of a gravity anomaly into a vertical gravity-gradient anomaly, Izvestii͡a AN SSSR, Ser. geofiz. No. 8, 1171-1177.

*Kastin, O. M. (1965): Transformation of three-dimensional potential fields in connection with the computation of vertical derivatives, Izvestii͡a AN SSSR, Fizika Zemli No. 7, 66-81.

*Kazinskiĭ, V. A. (1963): Interpolation grids--purpose and principles of their synthesis in geophysics and geodesy, Izvestii͡a vuzov, Geod. i aėrofotos''emka No. 2, 79-91.

* ______________ (1964a): The investigation of the internal gravitational field of the earth, Izvestii͡a AN SSSR, Ser. geofiz. No. 11, 1608-1621; No. 12, 1832-1835.

* ______________ (1964b): Basic outlines and characteristics of the problem of underground gravimetry, Izvestii͡a vuzov, Geod. i aėrofotos''emka No. 3, 63-69.

Kolmogorova, P. P. (1962): Computer-aided numerical solution of the improper integrals encountered in the interpretation of magnetic and gravity anomalies, Geol. i geofiz. No. 4, 115-118.

Koval', L. A. (1962a): Selection of formulas for computer-aided calculation of terrain corrections in gravimetric prospecting, Qazaq SSR Ǧilım akademiyasınıŋ habarları, Ser. geol. No. 2(47), 120-125.

__________ (1962b): Concerning allowance for the terrain effect in a gravity survey, Trudy Kazakhskogo politekh. in-ta No. 22, 173-177.

__________ (1962c): Computer-aided calculation of corrections for the terrain effect in gravimetric prospecting (example), Qazaq SSR Ǧilim akademiyasiniŋ habarlari, Ser. geol. No. 5(50), 102-103.

__________ (1963): Computer-aided calculation of corrections for the terrain effect in gravimetry, Qazaq SSR Ǧılım akademiyasınıŋ habarları, Ser. geol. No. 4(55), 96-107.

Krotkova, Ė. I. (1965): Chart as an aid in allowing for the effect of near zones on the quasi-geoid height and deflection of the vertical in the determination of the influence of distant zones with Molodenskiĭ's formulas, Trudy T͡SNIIGAiK No. 157, 109-115.

Krzhizhanovskai͡a, L. A. (1964): Numerical characterization of the local figure of the earth, Zapiski Leningradskogo gornogo in-ta 43(3), 106-113.

Kunin, N. I͡A. and N. G. Davydov (1963): The accuracy of gravimeter surveys and the sources of error, Razvedochnai͡a i promyslovai͡a geofiz. No. 49, 94-100.

Ladynin, A. V. (1965): Some probler of the computation of gravity anomalies in the Bouguer reduction with varying density of the topographic masses, Geol. i geofiz. No. 2, 99-106.

*Lapina, M. I. (1965): Computation of vertical derivatives of two-dimensional potential functions, Izvestii͡a AN SSSR, Fizika Zemli No. 7, 48-65.

*Lapina, M. I. and V. N. Strakhov (1963): New method of computation of vertical derivatives of potential fields in an upper half-space, Izvestii͡a AN SSSR, Ser. geofiz. No. 4, 561-577.

Li͡ubalin, V. D. (1963): Allowance for the terrain effect in the execution of a gravimeter survey, Geofiz. razvedka No. 13, 86-92.

Li͡ustikh, E. N. and V. A. Magnit͡skiĭ (1963): Vertical movements of the earth's crust, time variations of the gravitational field, and motions of the subcrustal masses, Sovremennye dvizhenii͡a zemnoĭ kory No. 1, 33-36.

*Makarov, N. P. (1965): The Faye reduction, Izvestiia vuzov, Geod. i aérofotos''emka No. 1, 77-79.

*Marych, M. I. (1963): Determination of the earth's figure with allowance for small third-order quantities, ibid., No. 3, 65-74.

_____ (1964a): Concerning computations of deflections of the vertical, Geod., kartografiia i aérofotos''emka No. 1, 56-57.

_____ (1964b): Concerning Stokes' formula, ibid., No. 1, 58-61.

_____ (1965): The determination of deflections of the vertical on the physical surface of the earth, ibid., No. 3, 54-58.

Mel'kanovitskii, I. M. (1962): Calculation of the correction for the attraction of an intermediate layer of masses with a varying density, Razvedochnaia i promyslovaia geofiz. No. 43, 65-71.

Menaker, G. I. (1962): Charts for computing terrain corrections in gravity observations, Biulleten' nauchno-tekh. informatsii Ministerstva geol. i okhrany nedr SSSR No. 7(41), 49-52.

_____ (1964): The application of precise interpolation in the determination of corrections for the local relief, Razvedochnaia i promyslovaia geofiz. No. 51, 68-70.

Mendelutsa, V. M. (1964): Feasibility of modeling three-dimensional problems on electroconductive paper, Geofiz. sbornik In-ta geofiz. AN UkrSSR No. 7(9), 133-141.

Mihal', N. K. (1962): Concerning the accuracy of determination of reduction constants, geoid heights, and deflections of the vertical, Nauchnye zapiski L'vovskogo politekh. in-ta No. 85, 54-67.

* _____ (1963): Concerning I. F. Monin's paper "A method of studying the earth's figure without a normal field," Izvestiia vuzov, Geod. i aérofotos''emka No. 6, 141-144.

_____ (1965a): Lektsii po teorii figury Zemli--Chast' I, Teoriia n'iutonovskogo potentsiala i sfericheskie funktsii [Lectures on the theory of the earth's figure--Part I, Theory of Newtonian potential and the spherical functions]. L'vov, L'vovskii politekh. in-t, 87 pp.

__________ (1965b): A few words about basic problems of the theory of the earth's figure, Geod. kartografiia i aerofotos''emka No. 3, 59-62.

__________ (1966): Comment on the new method of solution of Dirichlet's boundary value problem proposed by V. V. Brovar, ibid., No. 4, 129-131.

Molodenskiĭ, M. S. (1967): Accuracy of the computation of the anomalous part of the gravitational field outside the earth, Trudy TSNIIGAiK No. 176.

Monin, I. F. (1961): The solution of the basic problems of geodetic gravimetry, Nauchnye zapiski L'vovskogo politekh. in-ta, Ser. geofiz. No. 6, 43-93.

__________ (1962a): Determination of the figure of the regularized geoid with allowance for third-order quantities, Nauchnye zapiski L'vovskogo politekh. in-ta No. 85, 86-93.

__________ (1962b): Formula of the distribution of gravity for the European part of the USSR, ibid., No. 85, 94-99.

*__________ (1962c): Determination of the earth's figure with a relative error of the order of the square of the flattening of the earth ellipsoid, Izvestiia vuzov, Geod. i aerofotos''emka No. 4, 101-115.

*__________ (1963): The theory of the regularized geoid, ibid., No. 6, 91-94.

*__________ (1963a): The computation of deflections of the vertical, Astr. zhurnal 40(1): 179-183.

*__________ (1963b): Determination of the topographical surface of the earth with a relative error of the order of the square of the flattening of the earth ellipsoid, ibid., 40(3), 571-578.

__________ (1963c): Computations of gravity anomalies, quasi-geoid heights, and deflections of the vertical, Dopovidi AN URSR No. 5, 596-599[in Ukrainian].

__________ (1963d): On an estimate in the theory of the earth's figure, ibid., No. 7, 879-882[in Ukrainian].

__________ (1963e): Concerning the determination of the shape of the topographic surface of the earth, ibid., No. 9, 1177-1181[in Ukrainian].

__________ (1965a): On the determination of the figure and external gravitational field of the earth, Geod., kartografiia i aérofotos"emka No. 2, 24-30.

__________ (1965b): Concerning the determination of the figure and external gravitational field of the earth, ibid., 150-159.

*__________ (1965c): The theory of the determination of the earth's topographical surface, Izvestiia vuzov, Geod. i aérofotos"emka No. 6, 71-76.

*__________ (1965d): Solution of M. S. Molodenskii's integral equation defining the figure of the earth's physical surface with allowance for third-order quantities, Astr. zhurnal 42(1), 183-189.

__________ (1965e): The determination of the figure of the geoid with allowance for third-order quantities, Dopovidi AN URSR No. 5, 584-587[in Ukrainian].

__________ (1965f): The determination of the vertical gravity gradient of the geoidal earth, ibid., No. 7, 893-896[in Ukrainian].

*__________ (1966): A new method for computing the elements of the external gravitational field and of the figure of the earth's topographic surface, Astr. zhurnal 43(3), 670-677.

__________ (1966a): Determination of the figure of the earth's topographical surface from the anomalies of the vertical gradient of gravity, Geod., kartografiia i aérofotos"emka No. 4, 37-46.

__________ (1966b): Determination of the vertical gravity gradient of the real earth, Dopovidi AN URSR No. 1, 76-79[in Ukrainian].

__________ (1966c): Deflections of the vertical on the topographic surface of the earth, ibid., No. 2, 175-179[in Ukrainian].

__________ (1966d): A solution to M. S. Molodenskii's integral equation defining the shape of the topographic surface of the earth, ibid., No. 3, 345-348[in Ukrainian].

*Mosienko, B. A. (1966): Photointegral method for upward extrapolation of potential fields, Izvestiia AN SSSR, Fizika Zemli No. 6, 55-59.

Mudretsova, E. A. (1963): Allowance for the terrain effect in precise measurements with gravimeters in shafts and galleries and at surface level, Izvestiia vuzov, Geol. i razvedka No. 3, 93-112.

*Muralev, IA. G. (1964): Integral formulas for a chain of triangles projected onto a non-niveau surface approximating a reference ellipsoid, Izvestiia vuzov, Geod. i aérofotos''emka No. 5, 66-74.

* ______________ (1965): Use of M. S. Molodenskii's integral formulas to determine station coordinates in an astrogeodetic net, ibid., No. 4, 35-96.

* ______________ (1966): Adjustment of an astrogeodetic net with M. S. Molodenskii's integral formulas, ibid., No. 1, 65-78.

*Nedialkov, I. P. (1965): Composite interpretation of potential fields, Izvestiia AN SSSR, Fizika Zemli No. 11, 48-62.

*Nedialkov, I. P. and P. Kh. Byrnev (1963): Analytic continuation of gravity anomalies, Izvestiia AN SSSR, Ser. geofiz. No. 6, 922-935.

Nikiforov, B. I. (1964): Allowance for deflections of the vertical in the projection of measured distances on the reference ellipsoid, Trudy VNII gornoi geomekhaniki i marksheiderskogo dela No. 53, 309-314.

Novoselitskii, V. M. (1962): An integral equation for analytic continuation of gravity anomalies, Uchenye zapiski Permskogo un-ta No. 2, 41-43.

______________ (1963): The synthesis of computational formulas on the basis of Bateman's solution, ibid., No. 102, 103-107.

*Ogorodova, A. V. (1966): Influence of gravity anomalies in distant zones on the disturbing potential and its derivatives at an external point, Izvestiia vuzov, Geod. i aérofotos''emka No. 2, 113-124.

Orlova, E. M. (1965): Tables of allowances for the nonlinearity of the topographic mass influence on deflections of the vertical, Trudy TSNIIGAiK No. 157, 101-108.

Orlovskiĭ, A. S., I. M. Mel'kanovitskiĭ, and M. L. Belelovskiĭ (1962): Simplified procedures of allowance for the gravitational influence of the local relief (with eastern Central Asia as an example), Uchenye zapiski Sredneaziatskogo NII geol. i min. syr'i͡a No. 7, 183-191.

Ostach, O. M. (1967a): Determination of the disturbing potential and Stokes' constants of the earth with a Green's function, Trudy T͡SNIIGAiK No. 176.

__________ (1967b): Determination of the vertical gradient of gravity anomalies at the physical surface of the earth, ibid., No. 176

Ostach, O. M. and L. P. Pellinen (1966): Influence of the ellipticity of the earth on its Stokes' constants, ibid., No. 171, 63-68.

Pavel'ev, S. V. (1965): Finite-difference equations for computation of second vertical derivatives of anomalous fields, Trudy Kuĭbyshevskogo NII neft͡ianoĭ prom. No. 31, 210-225.

Pellinen, L. P. (1963): Laplace azimuths and coordinate errors in triangulation chains of great length, Geod. i kartografii͡a No. 8, 9-12

* __________ (1965a): Determination of the coefficients of the expansion of the earth's gravitational potential over spherical functions from a joint reduction of gravity and satellite data, Izvestii͡a vuzov, Geod. i aerofotos"emka No. 5, 65-73.

__________ (1965b): Application of the formulas of a first approximation for computation of characteristics of the earth's gravitational field, Trudy T͡SNIIGAiK No. 157, 85-100.

__________ (1966): Procedure for expansion of the earth's gravitational potential over spherical functions, ibid., No. 171, 36-62.

__________ (1967): The computation of deflections of the vertical and quasi-geoid heights in mountains, ibid., No. 176.

Pellinen, L. P., V. A. Taranov, and A. I. Shabanova (1964): Computation of gravimetric quasi-geoid heights and deflections of the vertical with a Ural-1 computer, Geod. i kartografii͡a No. 12, 9-13.

*Polonskii, A. M. (1966): The extrapolation of Δz- or Δg-anomalies upward from a curvilinear surface of observations, Izvestii͡a AN SSSR, Fizika Zemli No. 11, 77-82.

Ponosov, V. A. (1964): The computation of a relief correction with the aid of vertical profiles of the terrain, Uchenye zapiski Permskogo un-ta No. 122, 76-80.

*Raspopov, O. M. (1964): The computation of the second vertical derivative of the potential from the field of the first derivative, Izvestiia AN SSSR, Ser. geofiz. No. 8, 1213-1220.

*__________ (1965): Analysis and comparison of schemes used to calculate the second vertical derivative of a potential, Izvestiia AN SSSR, Fizika Zemli No. 1, 116-120.

Ražinskas, A. (1962): Concerning the detailed study of the quasi-geoid in flatland conditions, Lietuv. TSR Mok. Ak. darbai B3(30), 179-182 [in Lithuanian].

__________ (1963): Problems of geodetic gravimetry in Lithuania, Trudy Geod. sektsii AN LitSSR 1, 15-20[in Lithuanian].

Rudskiĭ, V. I. (1965): Transfer of astronomical coordinates from one point to another, Geod., kartografiia i aérofotos''emka No. 2, 47-51.

__________ (1966): A generalization of the formulas of transfer of astronomical coordinates and azimuth, ibid., No. 4, 47-51.

Sazhina, N. B. (1962): The thickness of the earth's crust and its relation to the relief and the gravity anomalies, Sov. geol. No. 8, 151-157.

*Shikhov, S. A. (1961): The stability of the analytic continuation of gravity anomalies, Izvestiia vuzov, Geod. i aérofotos''emka No. 6, 63-66.

Slepak, Z. M. (1964): Accelerated technique for introducing the terrain corrections in gravity surveys, Razvedochnaia i promyslovaia geofiz. No. 51, 80-82.

Sobokar', G. T. and T. S. Lebedev (1962): Trial allowance for the terrain effect in gravity investigations in mountainous regions, Geofiz. sbornik In-ta geofiz. AN UkrSSR No. 2(4), 33-40.

Sologub, V. S. (1962): Basic implications of the concept of potential, Vestnik Kievskogo un-ta No. 5, Ser. mat. i mekh. No. 2, 121-135[in Ukrainian].

Solov'ev, G. A., I. N. Kadyrov, and L. L. Liakhov (1963): The anomalous vertical gradient of gravity, Izvestiia vuzov, Geol. i razv. No. 7, 96-101.

Starostenko, V. I. (1963): Relation between the higher vertical derivatives of the gravitational potential and the horizontal gradients of gravity, Geofiz. sbornik In-ta geofiz. AN UkrSSR No. 5(7), 38-48.

Stepanov, P. P. (1963): The application of topographical-isostatic reductions, Prikladnaia geofiz. No. 37, 147-153.

*Stoĭnov, V. P. (1966): Determining the deflections of the vertical on the basis of Molodenskiĭ's theory, Izvestiia vuzov, Geod. i aerofotos''emka No. 3, 75-87.

*Strakhov, V. N. (1962): Analytic continuation of two-dimensional potential fields and its employment for solving the inverse problem of magnetic and gravimetric prospecting, Izvestiia AN SSSR, Ser. geofiz. No. 3, 307-316; No. 4, 491-505.

*__________ (1962b): The theory of computation of the second vertical derivatives of potential fields, ibid., No. 12, 1772-1785.

__________ (1962c): Approaches to the synthesis of a mathematical theory for the interpretation of magnetic and gravity anomalies, Prikladnaia geofiz. No. 35, 95-128.

*__________ (1963a): A few remarks on N. L. Afanas'ev's paper "The smoothing of gravity anomalies," Izvestiia AN SSSR, Ser. geofiz. No. 4, 618-620.

*__________ (1963b): Some computational schemes for finding the second vertical derivatives of potential fields, ibid., No. 1, 110-127.

*__________ (1963c): Reduction of the problem of analytic continuation in a horizontal layer to the solution of convolution-type linear integral equations of the first kind with rapidly decreasing kernels, ibid., No. 8, 1206-1221.

*__________ (1963d-1964b): The synthesis of the best computational schemes for the transformation of potential fields, ibid., 1963, No. 12, 1780-1797; 1964, No. 1, 55-81; No. 3, 213-227.

* ______________ (1964c): A new method for computing convolution-type integrals, ibid., No. 12, 1819-1822.

* ______________ (1964d): The theory of the matching method, ibid., No. 4, 494-509.

* ______________ (1964e): The smoothing of observational values of potential fields, ibid., No. 10, 1479-1493; No. 11, 1634-1653.

* ______________ (1965a): An inverse problem in logarithmic-potential theory, Izvestiia AN SSSR, Fizika Zemli No. 1, 90-97.

______________ (1965b): The determination of the location of singularities of potential functions, Prikladnaia geofiz. No. 44, 132-161.

* ______________ (1966a): Analytic continuation into lateral half-spaces, Izvestiia AN SSSR, Fizika Zemli No. 7, 36-51.

* ______________ (1966b): Application of the Mehler-Fock integral transform to the solution of problems of the magnetic and gravitational methods of exploration geophysics, ibid., No. 11, 55-67.

* ______________ (1966c): A new method for inverting the Laplace transform and its employment in exploration geophysics, ibid., No. 11, 68-76.

*Strakhov, V. N. and V. M. Devitsyn (1965): The reduction of observational values of potential fields to a single level, ibid., No. 4, 60-72.

Stuopis, V. (1963): Modern science and the figure of the earth, Trudy Geod. sektsii AN LitSSR 1, 21-43[in Lithuanian].

Surkin, IU. V. (1964): The connection of isolated systems of coordinates, Trudy TSNIIGAiK 18(1), 15-21.

T'abatadze, K. (1965): Concerning systems of heights, Sak'art'velos politeknikuris institutis sromebi No. 6(104), 87-102[in Georgian].

Tolstikov, E. I., ed. (1966): Atlas Antarktiki [Atlas of the Antarctic], Vol. 1. Moscow, Glav. upr. geod. i kartografii, MG SSSR

*T͡Sirul'skiĭ, A. V. (1964): Relation of the problem of analytic continuation of a logarithmic potential to the problem of determining the boundaries of a disturbing region, Izvestii͡a AN SSSR, Ser. geofiz. No. 11, 1693-1696.

*T͡Sirul'skiĭ, A. V. and M. I. Sirotin (1964): On the analytic continuation of a logarithmic potential, ibid., No. 1, 105-109.

*Ushakov, S. A. (1962): The relation of the gravitational field to the geological structure of the investigated regions of Antarctica, Doklady AN SSSR 145(6), 1275-1278.

*Vol'vovskiĭ, I. S., V. Z. Ri͡aboĭ, and V. I. Shraĭbman (1962): The nature of the regional gravity anomalies of the Province of Bukhara and Khiva and adjoining areas, Izvestii͡a AN SSSR, Ser. geofiz. No. 5, 644-651.

*Voskoboĭnikov, G. M. (1962): The Carleman function and its application to the solution of certain geophysical problems, ibid., No. 11, 1579-1590.

* ________ ________ (1965): Integral transformations and the location of the singularities of a logarithmic potential, Izvestii͡a AN SSSR, Fizika Zemli No. 1, 76-89.

*Voskoboĭnikov, G. M. and M. I. Sirotin (1965): On the determination of the singularities in the analytic continuation of potential fields, ibid., No. 12, 21-30.

*Voskoboĭnikov, G. M., A. V. T͡Sirul'skiĭ, and M. I. Sirotin (1964): On some theoretical questions of gravimetry in papers by A. K. Malovichko and his co-workers, Izvestii͡a AN SSSR, Ser. geofiz. No. 11, 1702-1707.

Zagrebin, D. V. (1962): Stokes' formula for the case of an ellipsoidal niveau surface, Nauchnye zapiski L'vovskogo politekh. in-ta 85, 68-82.

Zakatov, P. S. (1964): Kurs vyssheĭ geodezii (sferoidicheskai͡a geodezii͡a, teoreticheskai͡a geodezii͡a i osnovy gravimetrii), Izdanie 3-e, dopolnennoe i ispravlennoe--Uchebnik dli͡a geodezicheskikh vuzov i fakul'tetov [A course in higher geodesy (spheroidal geodesy, theoretical geodesy, and fundamentals of gravimetry), third edition, expanded and revised--Textbook for university-level geodetic institutions and departments]. Moscow, Nedra.

Zavgorodniĭ, A. L. (1963): Procedure for determining mean values from maps of isopleths, Qazaq SSR Ğılım akademiyasınıŋ habarşısı No. 8, 63-70.

Zemlîanov, V. N. (1963): Possibilities for increasing the accuracy of the allowance for topographical masses in a gravity survey in a mountainous location, Informatsionnyĭ sbornik Primorskogo geol. upr. Glav. upr. geol. i okhrany nedr pri Sovete Ministrov RSFSR No. 4, 69-74.

Zhongolovich, I. D. (1960): Historical premises of modern methods for the determination of the irregular rotation and the figure of the earth from observations of its satellites, VVU Astronomijos Observatorijos Biuletenis No. 2, 20-28.

Zhongolovich, I. D. (1962): Review of results of determining parameters of the earth's gravitational field from satellite tracking data, Bîulleten' stantsiĭ opt. nabliudeniîa ISZm spetsial'nyĭ vypusk, pp. 25-35 [Engl. transl.: Cambridge, SAO, 1964, pp. 23-36].